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A Preliminary Evaluation of Dry Season/Drought Status in the Sahelian zone
of Mali, Mauritania and Senegal, based on ERTS-1 Imagery.

SR 368

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Current Imagery:	11 April	1262-10283	(Mauritania # 1)	C=N 15-01/W08-55
	11 April	1262-10290	(Diéma)	N 14-34/W09-15
	12 April	1263-10342	(Mauritania # 2)	N 15-02/W10-21
	13 April	1264-10400	(Mauritania # 3)	N 15-02/W11-47
	16 April	1267-10571	(Senegal River)	N 16-02/W16-05
	16 April	1267-10574	(Saloum)	N 14-35/W16-26
Comparison:	31 October	1100-10283	(Diéma)	
	7 March	1227-10342	(Mauritania # 2)	
	16 Nov.		(Segou)	

Current Imagery is prepared with diazo transparencies [MSS Band 4 yellow, Band 5 magenta and Band 7 cyan], from 9 x 9 positive transparencies.

The imagery used in comparison is prepared with diazo transparencies from 70 mm positive transparencies.

A first look analysis of 6 scenes (11-16 April) in the northern margin of the Sahelian zone in western Francophone Africa confirms and is consistent with late dry season manifestations. Because the 1973 late dry season follows a period of rainfall deficit, an attempt is made to distinguish between normal late dry season and drought conditions. The aims of the analysis were (1) to evaluate the status of the dry-season/drought, and (2) to indicate areas in which ERTS-1 imagery analysis might provide potential support for remedial actions.

1. Vegetation. Preliminary analysis of the status of vegetation in the Sahelian zone as determined from ERTS imagery was analyzed in two steps. First, the presence of vegetation two selected regions in the Sahelian zone southern Mauritania and Mali in the region near Diéma, was determined from composites of cyan and magenta diazo transparencies prepared from MSS bands 7 and 5. In these composites of October (Diéma) and March (Mauritania) regions of living vegetation can be seen as shades of red, with the shade varying according to the density and type of vegetation. Crop vegetation can be distinguished primarily by its pattern and knowledge of planting and cropping patterns in the regions. Brush vegetation

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(E73-10488) A PRELIMINARY EVALUATION OF
DRY SEASON/DROUGHT STATUS IN THE SAHELIAN
ZONE OF MALI, MAURITANIA AND SENEGAL,
BASED ON ERTS-1 IMAGERY (American Univ.)
5 p HC \$3.00

appears as pink to red in the southern portion of the Mauritania image, varying with density of cover. Similar areas, as well as much crop-related vegetation appear in the Diéma frame. April imagery of the two areas, however, appears very different. Regions which showed even rather dense growth now appear very pale pink or colorless indicating a loss of chlorophyll or absence of living leaves.

The second step of the analysis in which the status of the vegetation in April was specifically compared to earlier dates was performed by analyzing diazo composites from April and from one or more earlier dates. Band 5 for the April scenes was reproduced in cyan, for the earlier dates in magenta. In the two-date composites most of the Mauritania # 2 scene appears pink to red, confirming lack of existence of living (chlorophyll) containing vegetation in this region in April. Whether this vegetation is actually dead is a question which can only be answered with subsequent coverage obtained after the drought situation has been alleviated by rainfall.

2. Hydrology. Preliminary analyses similar to those used for vegetation have been performed for detecting water in the two test regions and for evaluating the changes which have occurred in the drought period. The disappearance of several small rivers can be seen in the northern areas of the Diéma frame between October and April. Small waddis and streams are evident by their vegetation in Band 5 as well as by their appearance in Band 7 in the October imagery of Diéma, have disappeared by April. Two date composites of bands 7 or 5 confirm these changes.

Drying of larger rivers such as the Kolinbine, a tributary of the Senegal, and reported by Pollet and Winter to be an all season stream, can be seen in either single-date composites or in multi-date composites. This is seen as both a decrease in the area of water and as an increase in the area of highly reflecting mud-flats adjacent or in the river beds.

3. Provisional identification is made of these ethnic groups:

(1) Soninké in Diéma and Mauritania # 1 scenes, (2) Bambara in Diéma and Segou scenes, (3) Malinke in Diéma scene, (4) Maure in Mauritania # 1 scene, (5) Wolof and Serer in Saloum scene, and (6) Fulani and Bozo environs in Segou scene. Distinctive land use patterns are associated with different ethnic groups and boundaries can be mapped, provisionally. The boundaries are to be understood in the context of seasonal transhumant patterning, with groups and individuals moving in and out. Consulted ethnographic sources make estimates possible on location, movements and activities throughout the year including late dry season/drought conditions.

4. Individual Soninké villages are tentatively identified in the Diéma and Mauritania # 1 scenes, and Wolof or Serer villages are tentatively identified in the Saloum and Senegal River scenes. It is much easier to locate villages in the late dry season (April) than in other times during the cropping cycle, as may be seen in comparison with the October Diéma scene. Overlays of Soninké and Malinke and Wolof or Serer villages are being prepared. Wells are close to or inside of village perimeters and village location is thus a key to ground water supplies. Linearity in alignment of more than one village may be important. It is more difficult to locate Bambara, Fulani and Maure villages or camps.

5. A provisional assessment is made of usual cropping activities in relation to last year's light rains and present dry season/drought conditions. The Sahelian zone is the area of domestication of pearl millet [*Pennisetum americanum*], millet [*Brachiaria deflexa*], Fonio [*Digitaria iburua*], Rice [*Oryza glaberrima*], and Bambara nut [*Voandzeia*]. The reflectance characteristics of these crops, growing in this region, have not been ascertained by us, as yet. In October Soninké harvest dryland early millet, upland rice, dryland peanuts, dryland okra and beans. In October they plant wetland millet,

wet-

land millet, wetland maize, wetland peanuts, dryland potatoes and wetland calabash. Areas of high reflectance (harvest) and areas of burn (pre-planting) are both readily visible in October Diéma scene, tentatively identified as very light and very dark respectively. October planted crops should have been harvested in January, February and March. There does not appear to be a close correspondence between October burn and recently harvested bare land, except for side channel beds in the sw quadrant. Very provisionally there is the possibility that the 72 October planting failed. Field work is essential. New crops should be planted in June and future ERTS coverage should indicate this. In the Wolof-Serer areas of Senegal comparison is being made with Pelissier's work on this area. Both October and Jan-March harvest areas may be used for pasturage.

6. Fulani/Maure pastoralists keep drought reserve pasturage in small parcels, in areas with good water supply, and usually close to villages. The areas are not extensive. Such reserves are locally known and specific identification can only be made through field work. The reserves are in addition to the normal dry season, rainy season transhumant movements. In Soninké country, (and others) are known to contract with Maure/Fulani for pasturage rights to fields, after the October harvest. The Soninké fields are thus manured. The areas of Soninké October harvest are identified in the Diéma scene, but range condition and presence of animals are not known.

7. Conclusions:

- a, Six scenes of April coverage indicate very dry conditions in the paucity of living vegetation.
- b, Several all season streams apparently lack water at this time.
- c, Soninké and Senegalese villages can be readily mapped as an aid to location of population.

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